

issued



by the

SMITHSONIAN INSTITUTION  
U. S. NATIONAL MUSEUM

Vol. 101

Washington : 1951

No. 3278

FLEAS FROM THE UPPER SONORAN ZONE NEAR  
ALBUQUERQUE, N. MEX.

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DURING 1948 and 1949 a study was made of the fleas of some common rodents and rodent nests taken in the vicinity of Albuquerque, N. Mex. The more than 140 rodents examined included the large spotted ground squirrel [*Citellus spilosoma major* (Merriam)], kangaroo rats (*Dipodomys* spp.), grasshopper mice [*Onychomys leucogaster* (Wied)], and deer mice (*Peromyscus maniculatus* (Wagner)], obtained from the mixed grassland association found in the lower portion of the Upper Sonoran Zone, and the hoary woodrat (*Neotoma micropus canescens* Allen) and Say's rock squirrel [*Citellus variegatus grammurus* (Say)], found chiefly in the pinyon-juniper association or the upper portion of the Upper Sonoran Zone. As reported previously (Hoff and Williams, 1949), the nests examined were of the kangaroo rat (*Dipodomys spectabilis* Merriam) and the hoary woodrat mentioned above. The junior author is continuing the study to include the fleas of rodents found in biotic associations at higher elevations in the mountains near Albuquerque, N. Mex.

The junior author was largely responsible for the collection of rodents and nests,<sup>1</sup> although Ferd Sumrell and Dewitt Ivey aided in this work. The junior author also assumed responsibility for the final preparation of the drawings and the manuscript for publication, as well as for general supervision of the study. The senior

<sup>1</sup> The incidental field work was aided financially by a faculty research grant to the junior author from the University of New Mexico.

author prepared the fleas for study, made the identifications, wrote the descriptions of new species, and prepared drafts of the figures. The writers are deeply appreciative of the aid given by Maj. Robert Traub, of the Army Medical Center, Washington, D. C., and more especially of the help given by Dr. Frank M. Prince, of the Plague Suppressive Measures Laboratory, San Francisco, Calif. With exception of *Meringis dipodomys* Kohls (1938), Dr. Prince checked the identifications of representatives of all species recorded in the present paper. The specific determination of *M. dipodomys* was made by Major Traub.

During the course of this study two new species of fleas were discovered. These are described herein. In addition, nine species are reported for the first time from the State of New Mexico, and numerous other species are reported for the first time from the vicinity of Albuquerque. The present paper brings to a total of 34 the species and subspecies of fleas known from the State. With few exceptions the classification and nomenclature used here follow so closely the work of Hubbard (1947) that synonymies have been for the most part omitted. The species in the body of the present paper are systematically arranged in the order given by Hubbard.

The specimens upon which this study is based have been distributed to interested institutions, including the United States National Museum, the Texas State Department of Public Health, the Army Medical Center in Washington, the Plague Suppressive Measures Laboratory in San Francisco, and the Microbiological Institute of the Rocky Mountain Laboratory of the United States Public Health Service, in Hamilton, Mont. The holotypes and allotypes of new species have been deposited in the United States National Museum.

### Family HECTOPSYLLIDAE Baker, 1904

#### ECHIDNOPHAGA GALLINACEA (Westwood, 1875)

This species was taken from *Citellus variegatus grammurus* at Juan Tabo Recreation Area, 15 miles northeast of Albuquerque, on June 26, 1948; from *Citellus spilosoma major*, taken 2 miles north and northwest of the University of New Mexico campus on a number of occasions; and from *Onychomys leucogaster*, taken a short distance east of Albuquerque, on September 25, 1948.

### Family PULICIDAE Stephens, 1829

#### HOPLOPSYLLUS ANOMALUS (Baker, 1904)

This species was found on *Citellus variegatus grammurus*, taken at the Juan Tabo Recreation Area, about 15 miles northeast of Albuquerque, on June 26, 1948.

## ANOMIOPSYLLUS NOVOMEXICANENSIS, new species

FIGURE 66, a-d

Head: Frontal tubercle present, head apically angulate; in the male, dorsal margin of head somewhat flattened or depressed between the tubercle and cervicum. Genal armature of two slender bristles, one at the edge of antennal groove and the other near the midventral margin of the gena, with a short and very weak seta midway between the two. Postantennal region nude with exception of small setae at lower marginal angle. Bristles of the second antennal segment short in both sexes. The antenna of the male long and slender, shorter and stouter in the female. Labial palpi extending to about the distal margin of the forecoxae or slightly beyond; maxillary palpi often slightly longer.

Thorax: As in the genus.

Legs: Each of coxa II and III with a posterodistal spinelike lobe separated from coxa proper by a deep incision. Coxa III without a row or patch of spinelets on inner surface. Segment 5 of tarsi I and II with five pairs of plantar bristles, the proximal pair being situated medially between the bristles of the next two pairs or more nearly between the bristles of the second pair; fifth segment of tarsus III with only four pairs of plantar bristles, all lateral and forming two parallel rows.

Abdomen: Two anterior tergites usually with a few apical spinelets, in a few instances only on the first tergite; all tergites with a single row of weak setae. One well-developed antepygidial bristle on each side.

Modified segments, male: Sternite IX (fig. 66, a) of male bearing two black spiniforms near the tip and slightly proximal a longer and clear spiniform. Finger (fig. 66, b) subtriangular, wide at base and becoming narrow at tip; position of setae as in the figure; with three black spiniforms subevenly spaced near the posterior border. Process of clasper lobelike, directed dorsally, the posterior border rounded and with three setae.

Modified segments, female: Sternite VII as shown in figure 66, c. Spermatheca (fig. 66, d) has a rounded body and a crooked tail. Stylet about three times longer than wide, with one long bristle and two very short apical setae.

*Types*.—Holotype, allotype, and paratypes, U.S.N.M. No. 59336.

*Type locality*.—Six miles east of Albuquerque, at west foothills of Sandia Mountains, Bernalillo County, N. Mex. Male holotype, female allotype, 332 male paratypes, and 605 female paratypes from nests of the hoary woodrat (*Neotoma micropus canescens* Allen) collected on October 10, 1948; from nests of the same rodent, 62 male paratypes, and 126 female paratypes on February

28, 1948; and 16 male paratypes and 4 female paratypes from both a nest and animals collected in December 1947.

*Remarks.*—The known species of *Anomiopsyllus* Baker fall into two natural groupings. One of the groups includes forms with two spiniforms on the movable finger of the clasper and the second

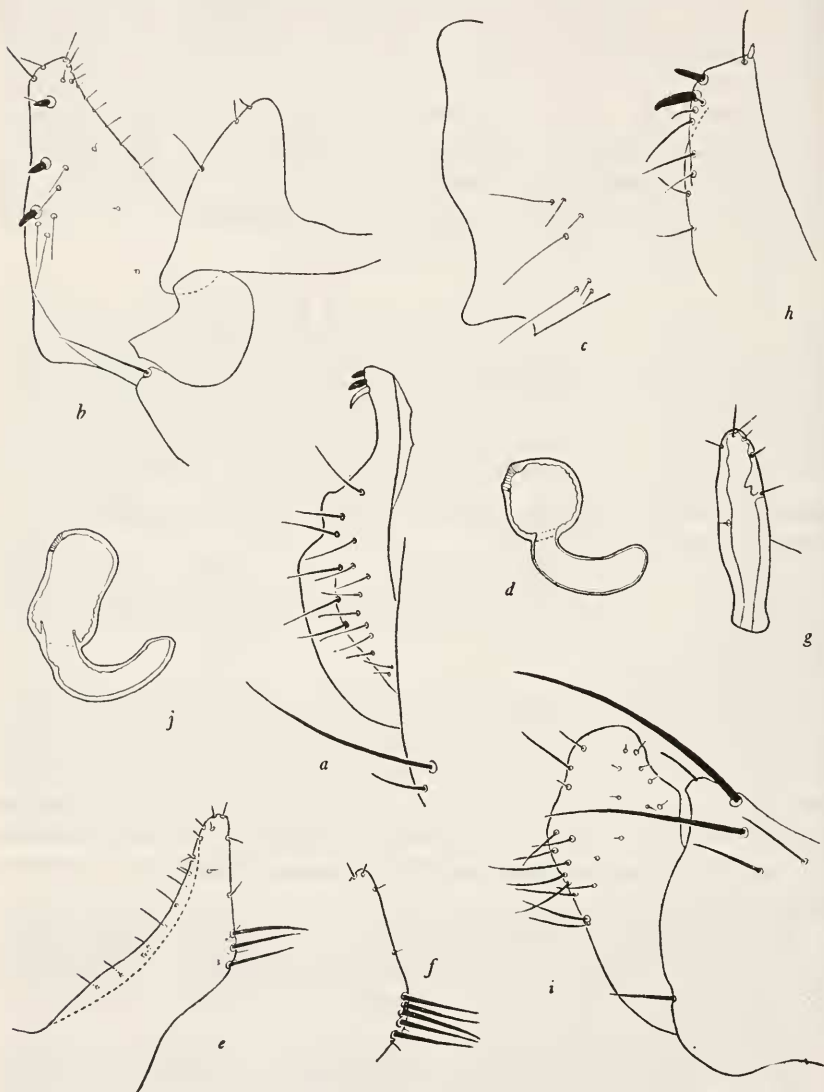


FIGURE 66.—a-d, *Anomiopsyllus novomexicanensis*, new species: a, Sternite IX of male holotype; b, finger and process of clasper, male holotype; c, sternite VII of female allotype; d, spermatheca of female allotype. e-g, *Megarthroglossus bisetis* Jordan and Rothschild: e, Sternite IX of male, three bristles on posterior margin; f, sternite IX of male, five bristles on the posterior margin; g, finger of clasper of male. h-j, *Meringis nidi*, new species: h, Sternite IX of male holotype; i, finger and process of clasper, male paratype; j, spermatheca of female allotype.

group includes species in which there are three spiniforms on the finger. Our form belongs in the second group and appears to be closely related to *A. hiemalis* Eads and Menzies, 1948, from Texas. In *hiemalis* the three spiniforms are subequally spaced along nearly the entire posterior border, while in our new species the spiniforms are more equally spaced and confined to about the distal half of the finger. In addition, in *hiemalis* there are a few bristles in a row between the central and basal spiniforms of the finger while in *novomexicanensis* no bristles occur between these two spiniforms.

### Family DOLICHOPSYLLIDAE Baker, 1905

#### ORCHOPEAS SEXDENTATUS (Baker, 1904), subspecies undetermined

Difficulties incident to the determination of subspecies in this species and the great variation that is observed in the lot of specimens at hand preclude subspecies determination at this time. The males in this collection usually have four spiniforms equally spaced on the posterior border and one above, although rarely there are only three equally spaced spiniforms on the posterior border and one above. Sternite IX of the male has one black spiniform and three bristles. In the female the apical outline of sternite VII is variable. Of the two lobes, there is a large amount of variation in the upper lobe. In some females the upper lobe may be longer than the lower lobe and the upper lobe may be pointed or rounded at the tip. The spermatheca is typically that of the species with the body barrel-shaped and with a crooked tail. Records of this undetermined subspecies include specimens taken from *Neotoma micropus canescens*, captured along the Rio Puerco near the U. S. Route 66 bridge and about 18 miles west of Albuquerque, on February 28, 1948, specimens from the same host, as well as a nest taken from the foothills of the Sandia Mountains, 5 miles east of Albuquerque, in December 1947, and from other nests taken in the same location on October 10, 1948.

#### THRASSIS PANSUS (Jordan, 1925)

Dr. Frank M. Prince, in litt., informs us that in the lot of our specimens examined by him the parameres are shaped differently from those in specimens from Cochise County, Arizona (type locality). However, he considers our specimens to be of this species. *Thrassis pansus* has been taken by us from *Onychomys leucogaster*, captured on the grassland a few miles east of Albuquerque, September 25, 1948, and has been removed in large numbers from *Citellus spilosoma major*, captured on various dates on the University of New Mexico golf course and within a few miles north



and east of Albuquerque. We also have one specimen from *C. s. major* trapped just west of the Rio Grande near Bernalillo, N. Mex., on February 21, 1948.

THRASSIS CAMPESTRIS Prince, 1944

*Thrassoides campestris* (Prince, 1944) HUBBARD, 1947, p. 146.

This form has been taken from *Dipodomys ordii* (Woodhouse), collected near the U. S. Route 66 bridge over the Rio Puerco and about 18 miles west of Albuquerque, on February 28, 1949, and from nesting materials and food storage of *Dipodomys spectabilis*, taken just east of Albuquerque, on March 6, 1948.

DIAMANUS MONTANUS (Baker, 1895)

This flea was found on *Citellus variegatus grammurus*, taken at the Juan Tabo Recreation Area, about 15 miles northeast of Albuquerque, on June 26, 1948.

(?) MALARAEUS SINOMUS (Jordan, 1925)

Since no males are present in the collection certain separation cannot be made between *M. sinomus* (Jordan, 1925) and *M. eremicus* (Baker, 1904). Two females have been taken from *Peromyscus maniculatus*, collected just west of the Rio Grande, near Bernalillo, N. Mex., on March 12, 1948.

MONOPSYLLUS WAGNERI (Baker, 1904), subspecies undetermined

A subspecific determination based entirely on females is so uncertain that none has been attempted. Five females were taken from *Peromyscus maniculatus*, collected just west of the Rio Grande, near Bernalillo, N. Mex., on March 12, 1948.

Family HYSTRICHOPSYLLIDAE Tiraboschi, 1904

ATYPHLOCERAS ECHIS Jordan and Rothschild, 1915

Numerous fleas of this species have been taken from an animal and a nest of *Neotoma micropus canescens*, collected near the base of the Sandia Mountains, about 5 miles east of Albuquerque, during December 1947.

MEGARTHROGLOSSUS BISETIS Jordan and Rothschild, 1915

FIGURE 66, c-g

Hubbard (1947) reduces this species to a subspecies of *M. divisus* (Baker, 1898). A short description is given here of the previously undescribed male.

Head: One row of four bristles on gena, short ones alternating with very long ones (these bristles are not always in a straight row), also a few small bristles above this row. Postantennal region

with a very strong bristle near the posterior angle, a smaller one in the occipital region, and a few very small setae, especially along the posterior margin of the antennal groove. The antenna of the male much longer and relatively more slender than that of the female. Labial palpus of five segments, the ultimate one very long, slightly curved, apex produced more posteriorly than anteriorly. Labial palpi extending beyond tip of trochanter I, often nearly to the distal end of femur I.

Thorax: Pronotal comb usually composed of 16 teeth.

Legs: As for the genus; mid- and hind-femora with a medial row of bristles; tibiae without medial bristles. Fifth segment in all tarsi with a proximal ventral pair and four lateral pairs of plantar bristles.

Abdomen: As described for the genus; with a few apical spinelets on anterior tergites; abdominal tergites with but one row of bristles. The males have a single antepygidial bristle on each side.

Modified segments: Sternite IX (fig. 66, *e*, *f*) broad at base, narrowed at apex, curving upward and bearing near the center of the curved posterior edge three to five, usually four, bristles, the anterior edge and apex with small setae. Finger (fig. 66, *g*) slightly convex on both anterior and posterior borders, roughly subcylindrical, apex rounded; with a few setae along the margins. Process with usually three long setae and a few shorter setae on the posterior border.

*Records.*—Our records include one male specimen from *Peromyscus maniculatus*, collected just west of the Rio Grande, near Bernalillo, on March 12, 1948, and many specimens obtained on numerous occasions from the nests and animals of *Neotoma micropus canescens*, taken a few miles east of Albuquerque, at the foot of the Sandia Mountains.

#### EPITEDIA STANFORDI Traub, 1944

A single female was taken from a nest of *Neotoma micropus canescens*, near the Sandia Mountains, about 5 miles east of Albuquerque, in December 1947.

#### MERINGIS DIPODOMYS Kohls, 1938

Our records include two males taken from *Dipodomys ordii*, collected just west of the Rio Grande, near Bernalillo, on February 21, 1948.

#### MERINGIS PARKERI Jordan, 1937

Specimens were taken from *Neotoma micropus canescens*, captured near the U. S. Route 66 bridge over the Rio Puerco and about 18 miles west of Albuquerque, on February 28, 1948, and

from the same species of host and nest collected in the foothills of the Sandia Mountains, about 6 miles east of Albuquerque, in December 1947; other specimens were taken from *Onychomys leucogaster melanophrys* Merriam, collected just west of the Rio Grande, near Bernalillo, on March 12, 1948.

MERINGIS NIDI, new species

FIGURE 66, *h-j*

Head: Much as outlined for the genus by Hubbard (1947). Two rows of bristles present on gena, upper row of three or four medium-sized ones and a lower row of four heavy ones, two extending slightly beyond the genal teeth.

Thorax: As for the genus.

Legs: Coxa III with a row of spinelets on inner surface. Tarsal segment 5 of each leg with four pairs of lateral plantar bristles and a basal, submedian, ventral pair.

Abdomen: Tergal chaetotaxy as usual for the genus. Three antepygidial bristles on each side; of these the dorsal is the shortest, the middle one the longest, and the ventral is subequal to the middle bristle and twice the length of the dorsal or shortest bristle.

Modified segments, male: Sternite IX (fig. 66, *h*) with two, rarely three, black spiniforms on the posterior border near the apex; the dorsal spiniform is the shorter. Along the margin of the sternite proximal to the spiniforms occur some setae; at the apex formed by the juncture of the anterior and distal margins, there is located a small clear spiniform. Finger (fig. 66, *i*) is armed on the posterior border with numerous setae; apex somewhat flattened; anterior border of finger somewhat concave near the apex.

Modified segments, female: Sternite VII with a broadly undulating posterior margin, showing considerable variation. Spermatheca (fig. 66, *j*) with body subcylindrical, somewhat constricted near the middle; tail well bent.

*Types*.—Holotype, allotype, and paratypes, U.S.N.M. No. 59337.

*Type locality*.—Five miles east of Albuquerque, N. Mex. Male holotype, female allotype, 27 male paratypes, and 69 female paratypes from a nest of a kangaroo rat (*Dipodomys spectabilis*) collected on March 6, 1948, and three male paratypes and eight female paratypes from the food storage associated with the same nest.

*Remarks*.—This new species is near *M. dipodomys* Kohls, 1938, but the male can be separated by the heavier sternite IX and the different arrangement of spiniforms in *nidi*. Also in *M. nidi* the finger is much less regular in outline than it is in *dipodomys*.



## MERINGIS, species undetermined

Since the collection contains only females, certain specific identification is not practical. The specimens were taken from *Onychomys leucogaster melanophrys*, just west of the Rio Grande, near Bernalillo, on March 12, 1948.

## PEROMYSCOPSYLLA HESPEROMYS (Baker, 1904)

Two specimens were taken from *Peromyscus maniculatus*, captured just west of the Rio Grande, opposite Bernalillo, on March 12, 1948.

## PHALACROPSYLLA ALLOS Wagner, 1936

We have a record of this flea from *Peromyscus maniculatus*, taken west of the Rio Grande, near Bernalillo, on March 12, 1948.

## STENOPONIA AMERICANA (Baker, 1899)

In our collection there is a record of this flea from *Peromyscus nasutus* (Allen), collected in the Jemez Mountains, about 70 miles north of Albuquerque, on March 27, 1948.

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